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(54) **WINDING UNIT PROVIDED WITH IMPROVED ANTI-CURL DEVICE AND METHOD FOR PICKING UP A YARN END OF A BOBBIN FOLLOWING CUTTING, IN A WINDING UNIT**

(57) A winding unit (4) comprising a bobbin (8) wound about a corresponding hollow tube (12), a yarn clearer (20) adapted to verify the presence of defects in the yarn (16) unwound from the bobbin (8), a reel (24) onto which the yarn (16) unwound from the bobbin (8) is wound, a cutting device (28) to cut the yarn (16) when identifying yarn defects (16) to be eliminated, an anti-curl device (32) placed close to the bobbin (8) and adapted to prevent the yarn (16) on the bobbin side (8) from curling and/or twisting following the cutting or the yarn (16) from breaking. The anti-curl device (32) advantageously comprises an arm (36) positioned close to an upper end (40) of the bobbin (8), on the side where the yarn (16) is unwound from the bobbin (8). Said arm (36) is provided with at least one outlet nozzle (52) connected to a compressed air source so as to direct a flow of compressed air close to the upper end (40) of the bobbin (8), thus facilitating the entry of the yarn (16) into said hollow tube (12).

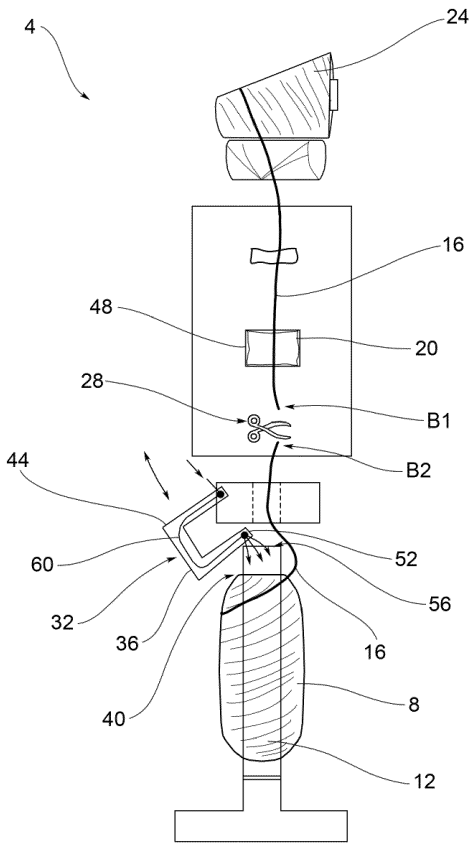

FIG.1

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Description

FIELD OF APPLICATION

[0001] The present invention relates to a winding unit provided with an improved anti-curl device, and to a related method for picking up a yarn end of a bobbin following cutting, in a winding unit.

BACKGROUND ART

[0002] As is known, various circumstances occur in winding units in which the yarn unwound from the bobbin and wound onto the reel breaks or is cut by the cutting means of the unit itself.

[0003] A part from the cases in which the yarn accidentally breaks, there are various steps, such as the knotting cycle, the bobbin replacement cycle, the bobbin ejection cycle due to excessive defectiveness, the detection of a defect in the yarn by the yarn clearer, in which the winding unit stops the winding step and cuts the yarn by means of specific cutting devices.

[0004] Under such situations, the section of yarn that goes from the cut end to the top of the bobbin tends to curl, i.e. to create undesired coils due to both the mechanical (due to the dragging of the yarn itself) and elastic residual tension.

[0005] Such coils create curls which gather close to the reel and create twisted slots.

[0006] The slots formed on the reel, which are caused by the raising of said coils, are a serious defect in the reel: problems may indeed be created in the next reel cycles, for example during the weaving operation, but also in the next knotting cycles.

INVENTION OVERVIEW

[0007] Anti-curl solutions exist in the art, which however do not always ensure a proper result.

[0008] Such known devices indeed include using arms which activate a friction on the yarn, close to the bobbin, in an attempt to prevent the yarn from curling following the cutting or from breaking.

[0009] Often, such solutions do not prevent the formation of curls and slots and do not resolve the problem of obtaining a later easy recovery of the end on the bobbin side, which is required, for example, for the next restoration of the winding step.

[0010] The need is therefore felt to solve the drawbacks and limitations mentioned with reference to the prior art.

[0011] Such a need is met by a winding unit according to claim 1 and by a method for picking up a yarn end of a bobbin following cutting in a winding unit according to claim 8.

DESCRIPTION OF THE DRAWINGS

[0012] Further features and advantages of the present invention will become more apparent from the following description of preferred and non-limiting embodiments thereof, in which:

figure 1 depicts a diagrammatic front view of a winding unit provided with an anti-curl device according to an embodiment of the present invention.

[0013] The elements or parts of elements common to the embodiments described below will be indicated using the same reference numerals.

DETAILED DESCRIPTION

[0014] With reference to the aforesaid drawings, an overall diagrammatic view of a winding unit according to the present inventio, is indicated as a whole by 4.

[0015] The winding unit 4 particularly comprises a bobbin 8 wound about a corresponding hollow tube 12, from which a yarn 16 is unwound.

[0016] The winding unit 4 comprises a yarn clearer 20 adapted to verify the presence of defects in yarn 16 unwound from bobbin 8, and a reel 24 onto which the yarn unwound from bobbin 8 is wound, upon the verification and elimination of any defects.

[0017] The winding unit 4 further comprises a cutting device 28 to cut yarn 16 when identifying defects to be eliminated of yarn 16.

[0018] The winding unit 4 advantageously comprises an anti-curl device 32, placed close to bobbin 8 and adapted to prevent yarn 16 on the bobbin side 8 from curling and/or twisting following the cutting of the yarn 16 itself.

[0019] It is worth noting that the cutting of yarn 16 may be intentional, i.e. performed following the operation of the cutting device 28, for example to eliminate a section of yarn 16 which comprises defects, or also accidental, due to a sudden breakage of yarn 16.

[0020] According to an embodiment, the anti-curl device 32 comprises an arm 36 positioned close to an upper end 40 of bobbin 8, and in particular to the hollow tube 12 onto which bobbin 8 is wound, on the side where yarn 16 is unwound from the bobbin itself.

[0021] Arm 36 is at least partially bent so as to form a loop 44 which surrounds and guides yarn 16 which is unwound from bobbin 8.

[0022] In other words, during the normal operation of the winding unit 4, arm 36 surrounds and guides yarn 16 which is unwound from bobbin 8 towards reel 24: the contact friction contributes to obtaining a first anti-curl effect.

[0023] According to an embodiment, arm 36 is interposed between the upper end 40 of bobbin 8 and a control device 48 of the path of yarn 16 during the unwinding from bobbin 8.

[0024] Said arm 36 is advantageously provided with at least one outlet nozzle 52 connected to a compressed air source so as to direct a flow of compressed air close to the upper end 40 of bobbin 8 and especially of the hollow tube 12, thus facilitating the entry of yarn 16 into said hollow tube 12.

[0025] It is worth noting that the insertion of yarn 16 into the cavity of tube 12 may be direct and indirect.

[0026] In the case of direct action, the flow of air impacts against the yarn and pushes it to enter the hollow tube 12.

[0027] Said outlet nozzle 52 is configured for this purpose to send the flow of compressed air at least partially into the hollow tube 12, through an upper hole 56 of said hollow tube 12.

[0028] In case of indirect action, the flow of compressed air does not directly impact against yarn 16, rather by creating a high-speed air motion due to the resulting pressure reduction (Bernoulli Effect), it creates a suction of yarn 16, which is sucked into the hollow tube 12.

[0029] For this purpose, said outlet nozzle 52 is configured to send the flow of compressed air above the hollow tube 12 so as to lap the upper hole 56 of said hollow tube 12, facing yarn 16 during the unwinding, and create a vacuum effect inside the tube 12 itself.

[0030] There are possible variants in order to send the flow of compressed air towards tube 12.

[0031] According to a first embodiment, said arm 36 is hollow and is internally crossed by said flow of compressed air. In other words, arm 36 acts both as a mechanical support/friction for yarn 16 during the unwinding from bobbin 8 and as a conveyor of the flow of compressed air therein.

[0032] According to a further possible embodiment, said arm 36 supports a supply duct 60 of compressed air which flows into said outlet nozzle 52; in such a configuration, arm 36 is not internally crossed by compressed air, rather supports a supply duct 60 prepared for this purpose.

[0033] The operation of a winding unit as well as the method for picking up a yarn end in a winding unit according to the present invention are now described.

[0034] In particular, during the normal operation of the winding unit, yarn 16 is unwound from bobbin 8 which is wound about a corresponding hollow tube 12.

[0035] Yarn 16 thus unwound is analyzed, in the path thereof, by the yarn clearer 20 adapted to verify the presence of defects in the unwound yarn 16 before it is wound onto the corresponding reel 24.

[0036] When a defect is identified, the final length of reel 24 is reached, or simply yarn 16 accidentally breaks, yarn 16 is interrupted, thus creating a pair of ends B1, B2.

[0037] A first upper end B1 is wound onto reel 24 while a second lower end B2 is subjected to the action of the anti-curl device 32.

[0038] The anti-curl device 32 particularly exerts both a mechanical action and a fluid-dynamic action on said second lower end B2 so as to prevent it from curling and/or twisting following the cutting of yarn 16.

[0039] The mechanical action is exerted by the friction between yarn 16 and arm 36 which at least partially winds the yarn 16 through said loop 44. Such a mechanical action tends to prevent the yarn from quickly contracting and therefore curling in an uncontrolled manner.

[0040] The fluid-dynamic action is obtained by virtue of the flow of air which, due to the Bernoulli Effect, creates a vacuum or depression close to the upper hole 56 of the hollow tube 12 of bobbin 8.

[0041] Such a depression pushes the second lower end B2 to enter the tube 12, thus preventing it from curling and/or forming slots.

[0042] As seen, the flow of compressed air may be at least partially sent into the hollow tube 12, through the upper hole 56 of said hollow tube 12, so as to hit and push yarn 16 directly into the hollow tube 12.

[0043] Then the yarn 16 inside the hollow tube 12 may be recovered by means of a specific pick-up mouth (not shown) driven close to the upper hole 56 of said hollow tube 12 of bobbin 8.

[0044] Once the second lower end B2 is recovered, it may be recovered to wind it onto a new reel or to joint it onto another end to continue the winding, for example.

[0045] As may be appreciated from the above description, the winding unit according to the invention allows the drawbacks introduced in the known art to be overcome.

[0046] After cutting the yarn with a blast of compressed air and therefore using the dynamic effect of the air, for example,

[0047] for a bobbin replacement or bobbin ejection, the solution of the present invention advantageously allows the section of the dangling yarn (which physically is between the scissors and the bobbin) to be inserted into the hole of the bobbin tube.

[0048] Therefore, two advantages are obtained, i.e.:

- the section of the end, in the free and therefore uncontrolled state, is prevented from being tied to other ends or from creating tangles along the belts and/or driving pulleys and the like during the return path/travel of the bobbin to a bobbin "restoration" station;
- the "picking up" of the end during the restoration is facilitated since said end is inserted into the tube of the bobbin.

[0049] Therefore, on the one hand, the curling of the yarn, and thus the creation of tangles, knots and/or slots, is prevented, and the next step of picking up the end itself for the recovery and/or reattachment thereof is facilitated.

[0050] Those skilled in the art, aiming at meeting contingent and specific needs, can make several changes and variants to the winding units of the present invention, all being contained within the scope of the invention, which is defined by the following claims.

Claims

1. Winding unit (4) comprising

   - a bobbin (8) wound around a relative hollow tube (12),
   - a yarn clearer (20) suitable to verify the presence of defects in the yarn (16) unwound from the bobbin (8),
   - a reel (24) onto which the yarn is wound (16) unwound from the bobbin (8),
   - a cutting device (28) to cut the yarn (16) in the case of identifying yarn defects (16) to be eliminated,
   - an anti-curl device (32), placed near the bobbin (8) and suitable to prevent the yarn (16) on the bobbin side (8) from curling and/or twisting following the cutting or breaking of the yarn (16),

   characterised in that

   - the anti-curl device (32) comprises an arm (36) positioned near an upper end (40) of the bobbin (8), on the side where the thread (16) is unwound from the bobbin (8),
   - said arm (36) being provided with at least one outlet nozzle (52) connected to a compressed air source, in order to direct a flow of compressed air near the upper end (40) of the bobbin (8), facilitating the entry of the yarn (16) inside said hollow tube (12).

2. Winding unit (4) according to claim 1, wherein said outlet nozzle (52) is configured to send the flow of compressed air above the hollow tube (12), so as to lap an upper hole (56) of said hollow tube (12), facing the yarn (16) in unwinding, and create a vacuum effect inside the tube (12).

3. Winding unit (4) according to claim 1 or 2, wherein said outlet nozzle (52) is configured to send the flow of compressed air at least partially inside the hollow tube (12), through an upper hole (56) of said hollow tube (12).

4. Winding unit (4) according to claim 1, 2 or 3, wherein said arm (36) is hollow and is internally crossed by said flow of compressed air.

5. Winding unit (4) according to claim 1, 2 or 3, in which said arm (36) supports a supply duct (60) of compressed air which flows into said outlet nozzle (52).

6. Winding unit (4) according to any one of the preceding claims, in which the arm (36) is at least partially bent so as to form a loop (44) that surrounds and guides the yarn (16) unwinding from the bobbin (8).

7. Winding unit (4) according to any one of the preceding claims, wherein the arm (36) is interposed between the upper end (40) of the bobbin (8) and a control device (48) of the yarn path (16) in unwinding from the bobbin (8).

8. Method of picking up an end (B2) of yarn (16) in a winding unit (4) comprising the steps of:

   - providing a winding unit (4) having a bobbin (8) wound around a relative hollow tube (12), a yarn cleaner (20) suitable to verify the presence of defects in the yarn (16) unwound from the bobbin (8), a reel (24) onto which the yarn (16) unwound from the bobbin (8) is wound, a cutting device (28) to cut the yarn (16) in the case of identifying yarn defects (16) to be eliminated,
   - providing an anti-curl device (32), placed near the bobbin (8) and suitable to prevent the yarn (16) on the bobbin side (8) from curling and/or twisting following the cutting or breaking of the yarn (16),
   - the anti-curl device (32) comprising an arm (36) positioned near an upper end (40) of the bobbin (8), on the side in which the thread (16) is unwound from the bobbin (8), said arm (36) being provided with at least one outlet nozzle (52) connected to a compressed air source,
   - in case of breakage or cutting of the yarn (16), directing a flow of compressed air near the upper end (40) of the bobbin (8), facilitating the entry of the yarn end (16) created on the bobbin side inside said hollow tube (12).

9. Method of picking up an end (B2) of yarn (16) in a winding unit (4) according to claim 8, wherein said outlet nozzle (52) is configured to send the flow of compressed air above the hollow tube (12) so as to lap an upper hole (56) of said hollow tube (12), facing the yarn (16) in unwinding, and to create a vacuum effect inside the tube (12).

10. Method of picking up an end (B2) of yarn (16) in a winding unit (4) according to claim 8 or 9, in which said outlet nozzle (52) is configured to send the compressed air flow at least partially inside the hollow tube (12), through an upper hole (56) of said hollow tube (12).

11. Method of picking up an end (B2) of yarn (16) in a winding unit (4) according to claim 8, 9 or 10, comprising the step of recuperating the end (B2) of the yarn (16) previously inserted inside the tube (12) of the bobbin (8), bringing an uptake nozzle near an upper hole (56) of said hollow tube (12) of the bobbin (8).

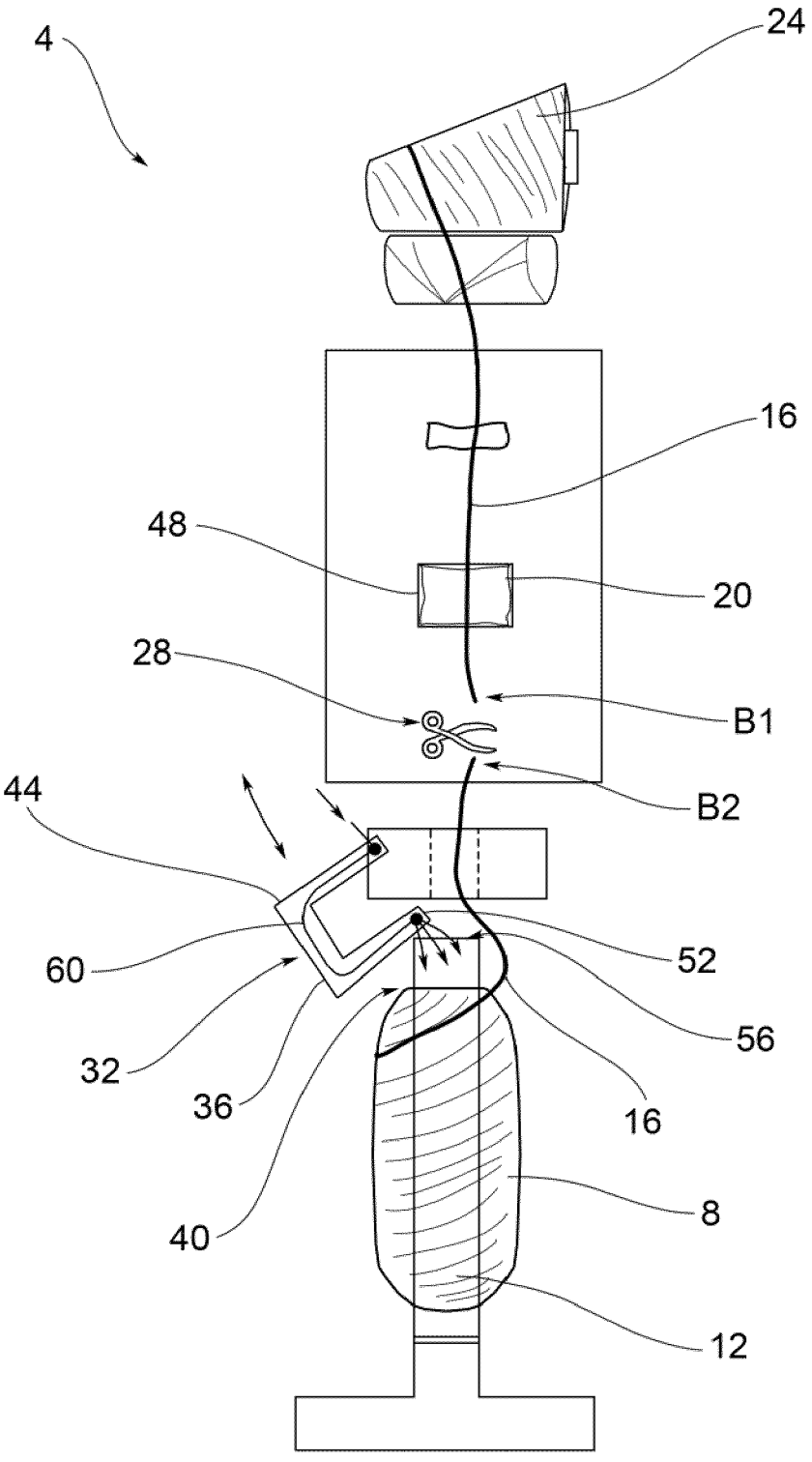

FIG.1

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EUROPEAN SEARCH REPORT

Application Number
EP 19 17 0326

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 September 2019	Pussemier, Bart

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